

SEQUENCE LISTING

<110> YAMAMOTO, SACHIKO
HANADA, TOSHIRO
SHIRO, MINORU
KOBATAKE, SHINZO

<120> HYBRID ENZYMES AND USE THEREOF

<130> 55986(70281)

<140> 09/879,257

<141> 2001-06-12

<160> 56

<170> PatentIn Ver. 2.1

<210> 1

<211> 206

<212> PRT

<213> Homo sapiens

<400> 1

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1 5 10 15

Thr Ser Tyr Val Ser Leu Lys Ala Pro Leu Thr Lys Pro Leu Lys Ala
20 25 30

Phe Thr Val Cys Leu His Phe Tyr Thr Glu Leu Ser Ser Thr Arg Gly
35 40 45

Tyr Ser Ile Phe Ser Tyr Ala Thr Lys Arg Gln Asp Asn Glu Ile Leu
50 55 60

Ile Phe Trp Ser Lys Asp Ile Gly Tyr Ser Phe Thr Val Gly Gly Ser
65 70 75 80

Glu Ile Leu Phe Glu Val Pro Glu Val Thr Val Ala Pro Val His Ile
85 90 95

Cys Thr Ser Trp Glu Ser Ala Ser Gly Ile Val Glu Phe Trp Val Asp
100 105 110

Gly Lys Pro Arg Val Arg Lys Ser Leu Lys Lys Gly Tyr Thr Val Gly
115 120 125

Ala Glu Ala Ser Ile Ile Leu Gly Gln Glu Gln Asp Ser Phe Gly Gly
130 135 140

Asn Phe Glu Gly Ser Gln Ser Leu Val Gly Asp Ile Gly Asn Val Asn
145 150 155 160

Met Trp Asp Phe Val Leu Ser Pro Asp Glu Ile Asn Thr Ile Tyr Leu
165 170 175

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Gly Gly Pro Phe Ser Pro Asn Val Leu Asn Trp Arg Ala Leu Lys Tyr
 180 185 190

Glu Val Gln Gly Glu Val Phe Thr Lys Pro Gln Leu Trp Pro
 195 200 205

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 <213> Homo sapiens

<400> 2
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<210> 3
 <211> 27
 <212> PRT
 <213> Homo sapiens

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<210> 4
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 <213> Homo sapiens

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 1 5 10

<210> 5
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<210> 6
 <211> 486
 <212> PRT
 <213> Leuconostoc mesenteroides

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 Lys Gly Tyr Leu Gln Lys His Phe Ala Ile Val Gly Thr Ala Arg Gln
 35 40 45
 Ala Leu Asn Asp Asp Glu Phe Lys Gln Leu Val Arg Asp Ser Ile Lys
 50 55 60
 Asp Phe Thr Asp Asp Gln Ala Gln Ala Glu Ala Phe Ile Glu His Phe
 65 70 75 80
 Ser Tyr Arg Ala His Asp Val Thr Asp Ala Ala Ser Tyr Ala Val Leu
 85 90 95
 Lys Glu Ala Ile Glu Glu Ala Ala Asp Lys Phe Asp Ile Asp Gly Asn
 100 105 110
 Arg Ile Phe Tyr Met Ser Val Ala Pro Arg Phe Phe Gly Thr Ile Ala
 115 120 125
 Lys Tyr Leu Lys Ser Glu Gly Leu Leu Ala Asp Thr Gly Tyr Asn Arg
 130 135 140
 Leu Met Ile Glu Lys Pro Phe Gly Thr Ser Tyr Asp Thr Ala Ala Glu
 145 150 155 160
 Leu Gln Asn Asp Leu Glu Asn Ala Phe Asp Asp Asn Gln Leu Phe Arg
 165 170 175
 Ile Asp His Tyr Leu Gly Lys Glu Met Val Gln Asn Ile Ala Ala Leu
 180 185 190
 Arg Phe Gly Asn Pro Ile Phe Asp Ala Ala Trp Asn Lys Asp Tyr Ile
 195 200 205
 Lys Asn Val Gln Val Thr Leu Ser Glu Val Leu Gly Val Glu Glu Arg
 210 215 220
 Ala Gly Tyr Tyr Asp Thr Ala Gly Ala Leu Leu Asp Met Ile Gln Asn
 225 230 235 240
 His Thr Met Gln Ile Val Gly Trp Leu Ala Met Glu Lys Pro Glu Ser
 245 250 255
 Phe Thr Asp Lys Asp Ile Arg Ala Ala Lys Asn Ala Ala Phe Asn Ala
 260 265 270
 Leu Lys Ile Tyr Asp Glu Ala Glu Val Asn Lys Tyr Phe Val Arg Ala
 275 280 285
 Gln Tyr Gly Ala Gly Asp Ser Ala Asp Phe Lys Pro Tyr Leu Glu Glu
 290 295 300
 Leu Asp Val Pro Ala Asp Ser Lys Asn Asn Thr Phe Ile Ala Gly Glu
 305 310 315 320

Leu Gln Phe Asp Leu Pro Arg Trp Glu Gly Val Pro Phe Tyr Val Arg
 325 330 335
 Ser Gly Lys Arg Leu Ala Ala Lys Gln Thr Arg Val Asp Ile Val Phe
 340 345 350
 Lys Ala Gly Thr Phe Asn Phe Gly Ser Glu Gln Glu Ala Gln Glu Ala
 355 360 365
 Val Leu Ser Ile Ile Ile Asp Pro Lys Gly Ala Ile Glu Leu Lys Leu
 370 375 380
 Asn Ala Lys Ser Val Glu Asp Ala Phe Asn Thr Arg Thr Ile Asp Leu
 385 390 395 400
 Gly Trp Thr Val Ser Asp Glu Asp Lys Lys Asn Thr Pro Glu Pro Tyr
 405 410 415
 Glu Arg Met Ile His Asp Thr Met Asn Gly Asp Gly Ser Asn Phe Ala
 420 425 430
 Asp Trp Asn Gly Val Ser Ile Ala Trp Lys Phe Val Asp Ala Ile Ser
 435 440 445
 Ala Val Tyr Thr Ala Asp Lys Ala Pro Leu Glu Thr Tyr Lys Ser Gly
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<210> 7
 <211> 39
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 7
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39

<210> 8
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 8
 ttcccggtt ttaattaacc tttaaacc

30

<210> 9
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 9
 tggttggtta gctatggaaa aaccagaatc

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<210> 10
 <211> 34
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 10
 taggatccag gtacgtctaa ttcttcaagg tatg

34

<210> 11
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 11
 atggatccgc tgattctaaa aacaatacct tc

32

<210> 12
 <211> 25
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 12
 aagcttgcat gcctgcaggt tcccg

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<210> 13
 <211> 54
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
 oligonucleotide consisting of DNA coding for amino acids
 of Sequence 2, and a partial restriction site of BamHI
 consisting of 5' end of "gatcc" and 3' end of "g"

<400> 13
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<210> 14
 <211> 54
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide

<400> 14
 gatccggaag tatccgactc tttgggaaac acaaaagcct tcctcgacat gtcg 54

<210> 15
 <211> 48
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide consisting of DNA coding for amino acids
 of Sequence 3, and a partial restriction site of BamHI
 consisting of 5' end of "gatcc" and 3' end of "g"

<400> 15
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<210> 16
 <211> 48
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide

<400> 16
 gatccccgc caagatagat ggtgttaatc tcattctggtg acagcacg 48

<210> 17
 <211> 42
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide consisting of DNA coding for amino acids
 of Sequence 4, and a partial restriction site of BamHI
 consisting of 5' end of "gatcc" and 3' end of "g"

<400> 17
 gatccctgaa gaagggatac actgtggggg cagaagcaag cg 42

<210> 18
 <211> 42
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide

<400> 18
 gatccgcttg cttctgcccc cacagtgtat cccttcttca gg 42

<210> 19
 <211> 36
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide consisting of DNA coding for amino acids
 of Sequence 5, and a partial restriction site of BamHI
 consisting of 5' end of "gatcc" and 3' end of "g"

<400> 19
 gatcccgggc actgaagtat gaagtgcaag gcgaag 36

<210> 20
 <211> 36
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
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<400> 20
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<210> 21
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 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide consisting of DNA coding for amino acids
 of Sequence 3, and a partial restriction site of BamHI
 consisting of 5' end of "gatcc" and 3' end of "g"

<400> 21
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<210> 22
 <211> 47
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide

<400> 22
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<210> 23
 <211> 33
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 23
 taggatccgt ctaattcttc aaggatatggc ttg 33

<210> 24
 <211> 34
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 24
 aaggatccgt acctgctgat tctaaaaaca atac 34

<210> 25
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 25
 ttggatccag caggtacgtc taattcttca ag 32

<210> 26
 <211> 33
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 26

taggatccga ttctaaaaac aataccttca tcg 33

<210> 27

<211> 34

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 27

gggtgtttaa aggtggatcc taattaaagc ccgg 34

<210> 28

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 28

taggatcctt ctgaaccaaa gttaaactg cc 32

<210> 29

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 29

atggatccca agaagcaca gaagctgtct tg 32

<210> 30

<211> 1024

<212> PRT

<213> Escherichia coli

<400> 30

Met Thr Met Ile Thr Asp Ser Leu Ala Val Val Leu Gln Arg Arg Asp
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Trp Glu Asn Pro Gly Val Thr Gln Leu Asn Arg Leu Ala Ala His Pro
20 25 30

Pro Phe Ala Ser Trp Arg Asn Ser Glu Glu Ala Arg Thr Asp Arg Pro
35 40 45

Ser Gln Gln Leu Arg Ser Leu Asn Gly Glu Trp Arg Phe Ala Trp Phe
 50 55 60
 Pro Ala Pro Glu Ala Val Pro Glu Ser Trp Leu Glu Cys Asp Leu Pro
 65 70 75 80
 Glu Ala Asp Thr Val Val Val Pro Ser Asn Trp Gln Met His Gly Tyr
 85 90 95
 Asp Ala Pro Ile Tyr Thr Asn Val Thr Tyr Pro Ile Thr Val Asn Pro
 100 105 110
 Pro Phe Val Pro Thr Glu Asn Pro Thr Gly Cys Tyr Ser Leu Thr Phe
 115 120 125
 Asn Val Asp Glu Ser Trp Leu Gln Glu Gly Gln Thr Arg Ile Ile Phe
 130 135 140
 Asp Gly Val Asn Ser Ala Phe His Leu Trp Cys Asn Gly Arg Trp Val
 145 150 155 160
 Gly Tyr Gly Gln Asp Ser Arg Leu Pro Ser Glu Phe Asp Leu Ser Ala
 165 170 175
 Phe Leu Arg Ala Gly Glu Asn Arg Leu Ala Val Met Val Leu Arg Trp
 180 185 190
 Ser Asp Gly Ser Tyr Leu Glu Asp Gln Asp Met Trp Arg Met Ser Gly
 195 200 205
 Ile Phe Arg Asp Val Ser Leu Leu His Lys Pro Thr Thr Gln Ile Ser
 210 215 220
 Asp Phe His Val Ala Thr Arg Phe Asn Asp Asp Phe Ser Arg Ala Val
 225 230 235 240
 Leu Glu Ala Glu Val Gln Met Cys Gly Glu Leu Arg Asp Tyr Leu Arg
 245 250 255
 Val Thr Val Ser Leu Trp Gln Gly Glu Thr Gln Val Ala Ser Gly Thr
 260 265 270
 Ala Pro Phe Gly Gly Glu Ile Ile Asp Glu Arg Gly Gly Tyr Ala Asp
 275 280 285
 Arg Val Thr Leu Arg Leu Asn Val Glu Asn Pro Lys Leu Trp Ser Ala
 290 295 300
 Glu Ile Pro Asn Leu Tyr Arg Ala Val Val Glu Leu His Thr Ala Asp
 305 310 315 320
 Gly Thr Leu Ile Glu Ala Glu Ala Cys Asp Val Gly Phe Arg Glu Val
 325 330 335
 Arg Ile Glu Asn Gly Leu Leu Leu Leu Asn Gly Lys Pro Leu Leu Ile
 340 345 350

Arg	Gly	Val	Asn	Arg	His	Glu	His	His	Pro	Leu	His	Gly	Gln	Val	Met	355	360	365	
Asp	Glu	Gln	Thr	Met	Val	Gln	Asp	Ile	Leu	Leu	Met	Lys	Gln	Asn	Asn	370	375	380	
Phe	Asn	Ala	Val	Arg	Cys	Ser	His	Tyr	Pro	Asn	His	Pro	Leu	Trp	Tyr	385	390	395	400
Thr	Leu	Cys	Asp	Arg	Tyr	Gly	Leu	Tyr	Val	Val	Asp	Glu	Ala	Asn	Ile	405	410	415	
Glu	Thr	His	Gly	Met	Val	Pro	Met	Asn	Arg	Leu	Thr	Asp	Asp	Pro	Arg	420	425	430	
Trp	Leu	Pro	Ala	Met	Ser	Glu	Arg	Val	Thr	Arg	Met	Val	Gln	Arg	Asp	435	440	445	
Arg	Asn	His	Pro	Ser	Val	Ile	Ile	Trp	Ser	Leu	Gly	Asn	Glu	Ser	Gly	450	455	460	
His	Gly	Ala	Asn	His	Asp	Ala	Leu	Tyr	Arg	Trp	Ile	Lys	Ser	Val	Asp	465	470	475	480
Pro	Ser	Arg	Pro	Val	Gln	Tyr	Glu	Gly	Gly	Gly	Ala	Asp	Thr	Thr	Ala	485	490	495	
Thr	Asp	Ile	Ile	Cys	Pro	Met	Tyr	Ala	Arg	Val	Asp	Glu	Asp	Gln	Pro	500	505	510	
Phe	Pro	Ala	Val	Pro	Lys	Trp	Ser	Ile	Lys	Lys	Trp	Leu	Ser	Leu	Pro	515	520	525	
Gly	Glu	Thr	Arg	Pro	Leu	Ile	Leu	Cys	Glu	Tyr	Ala	His	Ala	Met	Gly	530	535	540	
Asn	Ser	Leu	Gly	Gly	Phe	Ala	Lys	Tyr	Trp	Gln	Ala	Phe	Arg	Gln	Tyr	545	550	555	560
Pro	Arg	Leu	Gln	Gly	Gly	Phe	Val	Trp	Asp	Trp	Val	Asp	Gln	Ser	Leu	565	570	575	
Ile	Lys	Tyr	Asp	Glu	Asn	Gly	Asn	Pro	Trp	Ser	Ala	Tyr	Gly	Gly	Asp	580	585	590	
Phe	Gly	Asp	Thr	Pro	Asn	Asp	Arg	Gln	Phe	Cys	Met	Asn	Gly	Leu	Val	595	600	605	
Phe	Ala	Asp	Arg	Thr	Pro	His	Pro	Ala	Leu	Thr	Glu	Ala	Lys	His	Gln	610	615	620	
Gln	Gln	Phe	Phe	Gln	Phe	Arg	Leu	Ser	Gly	Gln	Thr	Ile	Glu	Val	Thr	625	630	635	640
Ser	Glu	Tyr	Leu	Phe	Arg	His	Ser	Asp	Asn	Glu	Leu	Leu	His	Trp	Met	645	650	655	

Val	Ala	Leu	Asp	Gly	Lys	Pro	Leu	Ala	Ser	Gly	Glu	Val	Pro	Leu	Asp	660	665	670	
Val	Ala	Pro	Gln	Gly	Lys	Gln	Leu	Ile	Glu	Leu	Pro	Glu	Leu	Pro	Gln	675	680	685	
Pro	Glu	Ser	Ala	Gly	Gln	Leu	Trp	Leu	Thr	Val	Arg	Val	Val	Gln	Pro	690	695	700	
Asn	Ala	Thr	Ala	Trp	Ser	Glu	Ala	Gly	His	Ile	Ser	Ala	Trp	Gln	Gln	705	710	715	720
Trp	Arg	Leu	Ala	Glu	Asn	Leu	Ser	Val	Thr	Leu	Pro	Ala	Ala	Ser	His	725	730	735	
Ala	Ile	Pro	His	Leu	Thr	Thr	Ser	Glu	Met	Asp	Phe	Cys	Ile	Glu	Leu	740	745	750	
Gly	Asn	Lys	Arg	Trp	Gln	Phe	Asn	Arg	Gln	Ser	Gly	Phe	Leu	Ser	Gln	755	760	765	
Met	Trp	Ile	Gly	Asp	Lys	Lys	Gln	Leu	Leu	Thr	Pro	Leu	Arg	Asp	Gln	770	775	780	
Phe	Thr	Arg	Ala	Pro	Leu	Asp	Asn	Asp	Ile	Gly	Val	Ser	Glu	Ala	Thr	785	790	795	800
Arg	Ile	Asp	Pro	Asn	Ala	Trp	Val	Glu	Arg	Trp	Lys	Ala	Ala	Gly	His	805	810	815	
Tyr	Gln	Ala	Glu	Ala	Ala	Leu	Leu	Gln	Cys	Thr	Ala	Asp	Thr	Leu	Ala	820	825	830	
Asp	Ala	Val	Leu	Ile	Thr	Thr	Ala	His	Ala	Trp	Gln	His	Gln	Gly	Lys	835	840	845	
Thr	Leu	Phe	Ile	Ser	Arg	Lys	Thr	Tyr	Arg	Ile	Asp	Gly	Ser	Gly	Gln	850	855	860	
Met	Ala	Ile	Thr	Val	Asp	Val	Glu	Val	Ala	Ser	Asp	Thr	Pro	His	Pro	865	870	875	880
Ala	Arg	Ile	Gly	Leu	Asn	Cys	Gln	Leu	Ala	Gln	Val	Ala	Glu	Arg	Val	885	890	895	
Asn	Trp	Leu	Gly	Leu	Gly	Pro	Gln	Glu	Asn	Tyr	Pro	Asp	Arg	Leu	Thr	900	905	910	
Ala	Ala	Cys	Phe	Asp	Arg	Trp	Asp	Leu	Pro	Leu	Ser	Asp	Met	Tyr	Thr	915	920	925	
Pro	Tyr	Val	Phe	Pro	Ser	Glu	Asn	Gly	Leu	Arg	Cys	Gly	Thr	Arg	Glu	930	935	940	
Leu	Asn	Tyr	Gly	Pro	His	Gln	Trp	Arg	Gly	Asp	Phe	Gln	Phe	Asn	Ile	945	950	955	960

Ser	Arg	Tyr	Ser	Gln	Gln	Gln	Leu	Met	Glu	Thr	Ser	His	Arg	His	Leu
				965				970				975			
Leu	His	Ala	Glu	Glu	Gly	Thr	Trp	Leu	Asn	Ile	Asp	Gly	Phe	His	Met
				980				985				990			
Gly	Ile	Gly	Gly	Asp	Asp	Ser	Trp	Ser	Pro	Ser	Val	Ser	Ala	Glu	Phe
				995				1000				1005			
Gln	Leu	Ser	Ala	Gly	Arg	Tyr	His	Tyr	Gln	Leu	Val	Trp	Cys	Gln	Lys
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<210> 31
<211> 448
<212> PRT
<213> Escherichia coli
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			20					25					30		
Leu	Arg	Asp	Ser	Leu	Ser	Asp	Lys	Pro	Ala	Lys	Asn	Ile	Ile	Leu	Leu
		35					40					45			
Ile	Gly	Asp	Gly	Met	Gly	Asp	Ser	Glu	Ile	Thr	Ala	Ala	Arg	Asn	Tyr
	50					55					60				
Ala	Glu	Gly	Ala	Gly	Gly	Phe	Phe	Lys	Gly	Ile	Asp	Ala	Leu	Pro	Leu
65					70					75					80
Thr	Gly	Gln	Tyr	Thr	His	Tyr	Ala	Leu	Asn	Lys	Lys	Thr	Gly	Lys	Pro
				85					90					95	
Asp	Tyr	Val	Thr	Asp	Ser	Ala	Ala	Ser	Ala	Thr	Ala	Trp	Ser	Thr	Gly
			100					105					110		
Val	Lys	Thr	Tyr	Asn	Gly	Ala	Leu	Gly	Val	Asp	Ile	His	Glu	Lys	Asp
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His	Pro	Thr	Ile	Leu	Glu	Met	Ala	Lys	Ala	Ala	Gly	Leu	Ala	Thr	Gly
	130					135					140				
Asn	Val	Ser	Thr	Ala	Glu	Leu	Gln	Asp	Ala	Thr	Pro	Ala	Ala	Leu	Val
145					150					155					160
Ala	His	Val	Thr	Ser	Arg	Lys	Cys	Tyr	Gly	Pro	Ser	Ala	Thr	Ser	Glu
				165					170					175	
Lys	Cys	Pro	Gly	Asn	Ala	Leu	Glu	Lys	Gly	Gly	Lys	Gly	Ser	Ile	Thr
			180					185					190		

Glu Gln Leu Leu Asn Ala Arg Ala Asp Val Thr Leu Gly Gly Gly Ala
 195 200 205
 Lys Thr Phe Ala Glu Thr Ala Thr Ala Gly Glu Trp Gln Gly Lys Thr
 210 215 220
 Leu Arg Glu Gln Ala Gln Ala Arg Gly Tyr Gln Leu Val Ser Asp Ala
 225 230 235 240
 Ala Ser Leu Asn Ser Val Thr Glu Ala Asn Gln Gln Lys Pro Leu Leu
 245 250 255
 Gly Leu Phe Ala Asp Gly Asn Met Pro Val Arg Trp Leu Gly Pro Lys
 260 265 270
 Ala Thr Tyr His Gly Asn Ile Asp Lys Pro Ala Val Thr Cys Thr Pro
 275 280 285
 Asn Pro Gln Arg Asn Asp Ser Val Pro Thr Leu Ala Gln Met Thr Asp
 290 295 300
 Lys Ala Ile Glu Leu Leu Ser Lys Asn Glu Lys Gly Phe Phe Leu Gln
 305 310 315 320
 Val Glu Gly Ala Ser Ile Asp Lys Gln Asp His Ala Ala Asn Pro Cys
 325 330 335
 Gly Gln Ile Gly Glu Thr Val Asp Leu Asp Glu Ala Val Gln Arg Ala
 340 345 350
 Leu Glu Phe Ala Lys Lys Glu Gly Asn Thr Leu Val Ile Val Thr Ala
 355 360 365
 Asp His Ala His Ala Ser Gln Ile Val Ala Pro Asp Thr Lys Ala Pro
 370 375 380
 Gly Leu Thr Gln Ala Leu Asn Thr Lys Asp Gly Ala Val Met Val Met
 385 390 395 400
 Ser Tyr Gly Asn Ser Glu Glu Asp Ser Gln Glu His Thr Gly Gln Leu
 405 410 415
 Arg Ile Ala Ala Tyr Gly Pro His Ala Ala Asn Val Val Gly Leu Thr
 420 425 430
 Asp Gln Thr Asp Leu Phe Tyr Thr Met Lys Ala Ala Leu Gly Leu Lys
 435 440 445

<210> 32

<211> 45

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic oligonucleotide consisting of DNA coding for amino acids of Sequence 2, and a partial restriction site of BamHI consisting of 5' end of "gatcc" and 3' end of "g"

<400> 32

gatccgacat gtcgaggaag gcttttgtgt ttcccaaaga gtcgg

45

<210> 33

<211> 45

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic oligonucleotide

<400> 33

gatcccgact ctttgggaaa cacaaaagcc ttctcgaca tgtcg

45

<210> 34

<211> 36

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic oligonucleotide consisting of DNA coding for amino acids of Sequence 2, and a partial restriction site of BamHI consisting of 5' end of "gatcc" and 3' end of "g"

<400> 34

gatccaggaa ggcttttgtg tttcccaaag agtcgg

36

<210> 35

<211> 36

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic oligonucleotide

<400> 35

gatcccgact ctttgggaaa cacaaaagcc ttctg

36

<210> 36

<211> 36

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 36

cacaggaaac agaccatggg atccgtttca gaaatc

36

<210> 37

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 37

ttggatccat caccggcacc atattgtgca cg

32

<210> 38

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 38

aaggatcctc agctgacttc aagccatacc ttg

33

<210> 39

<211> 31

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 39

aaggatccaa ggtatggctt gaagtcagct g

31

<210> 40

<211> 31

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 40

aaggatccaa ggtatggctt gaagtcagct g

31

<210> 41

<211> 30

<212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 41

ggtacgtata attcatcaag gtatggcttg

30

<210> 42

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 42

tatacgtacc tgctgattct aaaaac

26

<210> 43

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
 oligonucleotide consisting of DNA coding for
 amino acids of Sequence 2

<400> 43

aggaaggctt ttgtgtttcc caaagagtcg

30

<210> 44

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
 oligonucleotide

<400> 44

cgactctttg ggaaacacaa aagccttcct

30

<210> 45

<211> 55

<212> PRT

<213> Hepatitis B Virus

<400> 45

Met Gln Trp Asn Ser Thr Ala Phe His Gln Ala Leu Gln Asp Pro Arg

1

5

10

15

Val Arg Gly Leu Tyr Phe Pro Ala Gly Gly Ser Ser Ser Gly Thr Val
 20 25 30

Asn Pro Ala Pro Asn Ile Ala Ser His Ile Ser Ser Ile Ser Ala Arg
 35 40 45

Thr Gly Asp Pro Val Thr Asn
 50 55

<210> 46
 <211> 12
 <212> PRT
 <213> Hepatitis B Virus

<400> 46
 Asp Pro Arg Val Arg Gly Leu Tyr Phe Pro Ala Gly
 1 5 10

<210> 47
 <211> 42
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide consisting of DNA coding for amino acids
 of Sequence 46, and a partial restriction site of BamHI
 consisting of 5' end of "gatcc" and 3' end of "g"

<400> 47
 gatccgaccc gcgtgttcgt ggtctgtatt tcccggctgg tg 42

<210> 48
 <211> 42
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide

<400> 48
 gatccaccag ccgggaaata cagaccacga acacgcgggt cc 42

<210> 49
 <211> 84
 <212> PRT
 <213> Homo sapiens

<400> 49
 Ala Val Ser Glu Ile Gln Phe Met His Asn Leu Gly Lys His Leu Ser
 1 5 10 15

Ser Met Glu Arg Val Glu Trp Leu Arg Lys Lys Leu Gln Asp Val His
 20 25 30

Asn Phe Val Ala Leu Gly Ala Ser Ile Ala Tyr Arg Asp Gly Ser Ser
 35 40 45

Gln Arg Pro Arg Lys Lys Glu Asp Asn Val Leu Val Glu Ser His Gln
 50 55 60

Lys Ser Leu Gly Glu Ala Asp Lys Ala Asp Val Asp Val Leu Ile Lys
 65 70 75 80

Ala Lys Pro Gln

<210> 50
 <211> 15
 <212> PRT
 <213> Homo sapiens

<400> 50
 Glu Arg Val Glu Trp Leu Arg Lys Lys Leu Gln Asp Val His Asn
 1 5 10 15

<210> 51
 <211> 51
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide consisting of DNA coding for amino acids
 of Sequence 50, and a partial restriction site of BamHI
 consisting of 5' end of "gatcc" and 3' end of "g"

<400> 51
 gatccgaacg tggtgaatgg ctgcgtaaaa aactgcagga cgttcataac g 51

<210> 52
 <211> 51
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 oligonucleotide

<400> 52
 gatccggttat gaacgtcctg cagtttttta cgcagccatt caacacgttc g 51

<210> 53
 <211> 28

<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 53
tatgaccatg attacggatt cactggcc

28

<210> 54
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 54
ctgcccggtt attattattt ttgacaccag

30

<210> 55
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 55
taggatccta cgccaatgtc gttatccagc g

31

<210> 56
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 56
ttggatccag tgaagcgacc cgcattgacc

30